

66 ASSET MANAGEMENT: BRIDGES ANNUAL REPORT

Bridge conditions improve from 2016 to 2017

As of June 2017, 91.8% of WSDOT-owned bridges by deck area were in fair or better structural condition. This is an improvement over June 2016, when 91.2% of bridges by deck area were in fair or better condition (see chart below). WSDOT uses a Practical Solutions approach to maintenance, applying bridge preservation treatments at the most cost-effective time (see [p. 23](#)).

Measuring bridge conditions by deck area provides a more comprehensive view of system-wide conditions than only counting the number of bridges. For example, at the end of fiscal year (FY) 2017, 163 (4.9%) of WSDOT's 3,312 bridges were in poor condition, but reporting that figure alone would cause readers to underestimate the need for bridge repairs. Reporting bridge conditions by deck area allows WSDOT to clearly communicate that 8.2% of its bridge assets are structurally deficient.

This reporting method also aligns with the federal Moving Ahead for Progress in the 21st Century Act (MAP-21, see [p. 9](#)), and the state's Results Washington performance management system. The state and federal targets are identical, and apply only to the 2,272 WSDOT bridges and 204 locally owned bridges on the National Highway System (NHS). The targets require Washington to maintain its bridges so that less than 10% of bridges weighted by deck area are rated structurally deficient (in poor condition); Washington performed better than this standard.

Notable results

- At the end of FY2017, 91.8% of WSDOT-owned bridges by deck area were in fair or better condition, a slight increase from 91.2% in 2016
- Washington continues to meet the MAP-21 and Results Washington goals of having less than 10% of bridges in poor condition
- WSDOT conducted 1,435 bridge inspections during FY2017, 89% of which were routine
- WSDOT assembled a temporary Bailey bridge over the San Poil River on SR 21 in four days in April 2017

WSDOT has 91.8% of its bridges by deck area in fair or better condition, meeting performance goals

Fiscal years 2012, 2016, 2017; Number of bridges and percent of bridges by deck area and condition category;
Deck area in millions of square feet

STRUCTURAL CONDITION		2012	2016	2017	Trend (2016-17)	Desired trend
GOOD/VERY GOOD Bridges in good condition range from those with no problems to those having some minor deterioration of structural elements.	Bridge deck area	17.4	19.8	20.3	↑	↑
	Percent of deck area	33.1%	36.9%	37.3%	↑	↑
	Number of bridges	1,547	1,678	1,699		
FAIR Primary structural elements are sound; may have minor section loss, deterioration, cracking, spalling or scour. This is the most cost-effective time to rehabilitate before the underlying structure is damaged.	Bridge deck area	33.0	29.1	29.7	↑	*
	Percent of deck area	63.0%	54.3%	54.5%		
	Number of bridges	1,581	1,462	1,450		
GOOD/VERY GOOD & FAIR TOTALS: Goal = 90% or more deck area in fair or better condition	Bridge deck area	50.4	48.9	49.9	↑	↑
	Percent of deck area	96.1%	91.2%	91.8%		
	Number of bridges	3,128	3,140	3,149		
POOR (Structurally Deficient) A bridge in poor condition has advanced deficiencies such as section loss, deterioration, scour, or seriously affected structural components, and may have weight restrictions. A bridge in poor condition is still safe for travel.	Bridge deck area	2.1	4.7	4.5	↓	↓
	Percent of deck area	3.9%	8.8%	8.2%		
	Number of bridges	117	154	163		

Data source: WSDOT Bridge and Structures Office.

Notes: All years are state fiscal years (July 1–June 30). The above data shows WSDOT-owned bridges, culverts, and ferry terminals longer than 20 feet that carry vehicular traffic. All numbers shown in the table above are based on the revised “out-to-out” calculation method (which includes curbs and rails on the bridge) instead of the bridge width from curb to curb. The 2012 data was updated using this revised calculation method.

WSDOT owns 163 bridges in poor condition (structurally deficient) in 2017, of which 106 are located on the NHS. From July 2016 through June 2017, 21 WSDOT-owned bridges totaling 673,505 square feet of deck area in poor condition were repaired, transitioning them to good condition. Additionally, 30 WSDOT-owned bridges—with a net total of 491,206 square feet of deck area—deteriorated to poor condition.

Statewide structurally deficient bridges by deck area remain below 10% goal

As of June 2017, 7.6% (5.5 million square feet) of Washington's 72.1 million square feet of bridge deck area was located on structurally deficient bridges.

There are currently 370 structurally deficient bridges in Washington state, 163 of which are owned by WSDOT (see table below). This is an increase from FY2016, when 154 out of 342 statewide structurally deficient bridges were WSDOT-owned. WSDOT's 163 structurally deficient bridges account for 8.2% (4.5 million square feet) of WSDOT-owned bridge deck area. The remaining 207 structurally deficient bridges account for 5.9% (1 million square feet) of bridge deck area owned by local agencies.

Total (state and local) structurally deficient bridge deck area on the NHS in Washington state decreased from 4.6 million square feet in FY2016 to 4.3 million square feet in FY2017.

Condition of locally owned bridges improves in FY2017

Of the 7,373 bridges across Washington, 4,061 are locally owned and support an average of 10 million crossings per day. Approximately 96% of all Washington's locally owned bridges by deck area were in fair or better condition during the Federal Highway Administration 2017 reporting period (April 2016 through March 2017), improving from the 2016 reporting period.

WSDOT funds and administers the Local Bridge Program, which provides grants to local agencies to preserve and improve the conditions of city and county bridges that are physically deteriorated or structurally deficient. Grants

The National Highway System (NHS)

The National Highway System (NHS) is a network of strategic highways in the United States, and includes both state and local highways as well as roads serving major airports, ports, rail and/or truck terminals, and other transport facilities. Washington's NHS network includes 49.7 million square feet of bridge deck area, of which 90.9% is state-owned and 9.1% is owned by local agencies. The bridge performance targets in both Results Washington and MAP-21 (see [p. 21](#) and [p. 27](#)) apply specifically to bridges on the NHS.

Washington achieves goal of keeping structurally deficient bridge deck area below 10% statewide

As of June 2017; Percent of bridge deck area considered structurally deficient (SD); Deck area in millions of square feet

	National Highway System		Statewide	
	Deck area ¹	Number of bridges	Deck area ¹	Number of bridges
WSDOT-owned	45.1	2,272	54.4	3,312
Amount SD (%)	4.0 (8.9%)	106	4.5 (8.2%)	163
Locally owned ²	4.5	204	17.7	4,061
Amount SD (%)	0.3 (5.7%)	23	1.0 (5.9%)	207
Total	49.7	2,476	72.1	7,373
Amount SD (%)	4.3 (8.6%)	129	5.5 (7.6%)	370

Data source: WSDOT Bridge and Structures Office and WSDOT Local Programs Office.
Notes: Structurally deficient (SD) is equal to the state's poor condition rating; for locally owned bridges, SD also includes load-restricted bridges, even if those bridges are in fair or better condition.
¹ Due to rounding, some figures are not computable based on numbers in the table.
² Bridges owned by counties and cities.

from this program may fund bridge replacements or bridge rehabilitation and preservation projects such as scour repair, painting, seismic retrofit, deck overlay or joint replacement.

WSDOT is currently reviewing local agency project applications received in response to the Local Bridge Program's most recent call for

projects. Funds will be awarded to projects selected for the program in late fall 2017.

Cities and counties are responsible for managing local bridges, and are held to the same standards as WSDOT. Federal, state and local funding sources continue to help local agencies build new and maintain existing bridges.

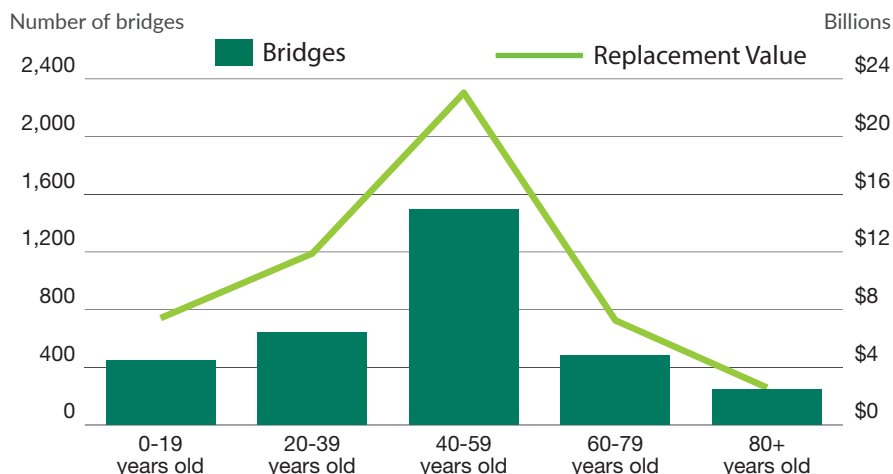
Replacing all Washington state bridges 80 years old or older would cost WSDOT \$2.6 billion in next 10 years

WSDOT owns 246 bridges that are 80 years old or older. Replacing these bridges as they near 100 years of age would cost nearly \$2.6 billion over the next 20 years, or approximately \$130 million per

year (in 2017 dollars). Many of these bridges will remain in use during the next 10 years—currently 24 of them (6% by deck area) are in poor condition—and WSDOT will continue to focus on their preservation.

Replacing WSDOT's 246 bridges that are 80 years or older would cost \$2.6 billion over the next 20 years

As of June 2017; Number of bridges by age; Replacement value in billions of dollars

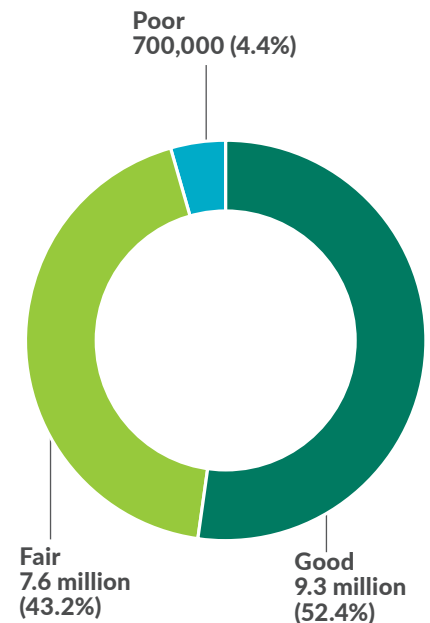


Data source: WSDOT Bridge and Structures Office.

Notes: The graph shows WSDOT-owned bridges only. Replacement value describes the cost to replace all bridges in each age range.

Majority of locally owned bridges in good condition in FY2017

Local agency bridge conditions by deck area for FY2017; Deck area in square feet



Data source: WSDOT Local Programs Office.

Note: This chart shows conditions for all locally owned bridges, both on and off the National Highway System.

WSDOT's bridge inventory grows by 32 structures

As of June 2017, the WSDOT-owned bridge inventory includes 3,897 structures. In addition to WSDOT's 3,312 vehicular bridges over 20 feet long, the inventory includes structures that are less than 20 feet long and structures not open to vehicular traffic (see table below). The replacement value of all WSDOT-owned bridges is estimated to be about \$58.2 billion.

Additionally, there are 5,734 locally owned bridge structures in Washington as of June 2017, a decrease of 195 structures from June 2016. This drop is due to the some duplicate entries that were removed when the state and local inventories were combined into one database. Vehicular bridges longer than 20 feet account for 71% of the local bridge

inventory, and total 17.7 million square feet of deck area.

The new State Route (SR) 520 floating bridge across Lake Washington was added to the WSDOT bridge inventory in FY2017, and is included in the table below. Although the bridge has been open to traffic since April 2016, it was not added to the inventory until the replacement contract was formally closed.

A contract to replace the SR 99 Alaskan Way Viaduct in Seattle with a tunnel is in progress. The existing double-decker bridge will be removed from the state's bridge inventory once the new tunnel opens to traffic and the viaduct can be removed.

Notes for graph at right:

- 1 The drop from FY2016 to FY2017 is due to the removal of duplicate entries which were discovered when combining state and local inventories into a single database during FY2017.
- 2 Locally owned culverts longer than 20 feet are included in the number of vehicular bridges longer than 20 feet.
- 3 WSDOT funds 50% of preservation for 11 border bridges.
- 4 Five of the border bridges are maintained by Oregon and one by Idaho.
- 5 The locally owned border bridge count is included in the number of vehicular bridges longer than 20 feet; therefore the one locally-owned border bridge is not included in the total bridge structures count.
- 6 Four of these bridges are shared with Oregon and one with Idaho.
- 7 Inventory totals do not equal the total number of state and local bridges on p. 17 or p. 18 because inventory includes miscellaneous structures that the Federal Highway Administration does not require to be inspected. FHWA requires states to report on conditions for all vehicular bridges, ferry terminals and culverts longer than 20 feet, which are the 3,312 WSDOT-owned and 4,061 locally owned structures in the chart on p. 18.

Washington's bridge inventory increases by 32 WSDOT-owned structures

Fiscal years 2016 and 2017; Inventory of WSDOT and local bridges

	WSDOT		Local	
	2016	2017	2016	2017
Vehicular bridges longer than 20 feet	3,109	3,124	4,041	4,061
Structures less than 20 feet long	418	431	1,465	1,251 ¹
Culverts longer than 20 feet	125	130	-. ²	-. ²
Pedestrian structures	81	80	264	264
Ferry terminal structures	69	69	9	9
Tunnels and lids	47	47	8	8
Border bridges³				
Maintained by border state	6 ⁴	6 ⁴	1 ⁵	1 ⁵
Maintained by Washington	5 ⁶	5 ⁶	-	-
Railroad bridges	5	5	142	141
Total Bridge Structures⁷	3,865	3,897	5,929⁵	5,734⁵

Data source: WSDOT Bridge and Structures Office and WSDOT Local Programs Office.

Majority of bridge inspections required by Federal Highway Administration in FY2017 are routine

WSDOT performed 1,435 bridge inspections in FY2017, 89% (1,278) of which were routine inspections. In addition, WSDOT conducted 89 inspections of fracture critical structures (bridges that contain support pieces or members that are under tension, where failure would likely cause a portion of or the entire bridge to collapse), 36 special (discretionary as-needed) inspections, and 32 underwater inspections.

Most of WSDOT's bridges are inspected on a two-year cycle as mandated by FHWA, but there are 118 bridges and ferry terminals which are inspected every year due to specific watch items (such as elements that are in need of repair or having a Bailey bridge installed). Additionally, a total of 523 concrete bridges that are in good condition and meet specific FHWA criteria are inspected on a four-year cycle.

WSDOT performs federally required inspections on all WSDOT-owned bridges as outlined in the National Bridge Inspection Standards to determine bridge conditions, maintain bridge safety, and identify preservation and maintenance needs.

Local agencies inspect 2,892 bridges

Local agencies performed 2,892 bridge inspections in FY2017, 96% (2,780) of which were routine. Local agencies follow the same federal guidance for inspections as the state.

Although most local governments inspect their own bridges, WSDOT conducts field reviews and provides training and technical assistance to Washington cities and counties for inspecting bridges on local roads.

WSDOT performs 1,278 routine bridge inspections and 20 routine ferry terminal inspections; Local agencies perform 2,780 routine inspections

Fiscal year 2017; Number of inspections by inspection type

Inspection type	WSDOT	Ferry terminals ¹	Local
Routine	1,278	20	2,780
Fracture critical	89	8	71
Special ²	36	8	17
Underwater	32	8	24
Total	1,435	44	2,892

Data source: WSDOT Bridge and Structures Office.

Notes: FHWA requires inspections on vehicular bridges and ferry terminals longer than 20 feet. WSDOT performs inspections on all structures included in the inventory on p. 20 but only reports on the inspections required by FHWA.

1 Ferry terminals owned by WSDOT. 2 These are discretionary and based on known or suspected deficiencies.



Leading indicator

Control the percent of National Highway System bridges, state and locally owned, in poor condition from increasing over 10% by 2020.

Status: On plan (green)

Strategies:

1. Replacing deteriorated bridge elements: WSDOT performs major preservation repairs by addressing specific bridge elements (such as floating bridge anchor cables, expansion joints and concrete columns) to improve bridges with low condition ratings.

Percent of bridges on the NHS that are structurally deficient (by deck area)

WSDOT owned	8.9%
Locally owned	5.7%
Combined	8.6%

2. Repainting steel bridges: A protective paint coating on a steel bridge is essential to prevent corrosion, extend the bridge's service life and keep the bridge in fair or better condition. Continuing to keep up with painting can prevent the number of bridges in poor condition from increasing.

3. Repairing concrete bridge decks: WSDOT is working to reduce the number of bridges classified as structurally deficient by addressing bridges with the highest benefits and the most cost savings. One strategy is to repair and rehabilitate concrete bridge decks to extend their service life.



Agency Emphasis Area PRACTICAL SOLUTIONS

By load restricting certain bridges, WSDOT uses Practical Solutions to reduce the risk of further damage to the structure while ensuring traveler safety. The practice also allows WSDOT to develop sound, cost-effective repair or replacement strategies.

WSDOT decreases number of load restricted and posted bridges to 119 in fiscal year 2017

A total of 119 WSDOT-owned bridges longer than 20 feet were load restricted or posted at the end of FY2017, down from 126 in FY2016. Nearly half (56) of WSDOT's load posted or restricted bridges are on the National Highway System, and 13.4% (16) were considered structurally deficient in FY2017. Two bridges (the SR 520 floating bridge and the SR 142 Klickitat River Bridge) were replaced in FY2017, removing the need for load restriction; the other five were repaired by either WSDOT maintenance crews or through contracts.

There were 216 locally owned bridges in Washington that were load restricted in FY2017 (of which 14 were on the NHS), an increase from 186 in FY2016.

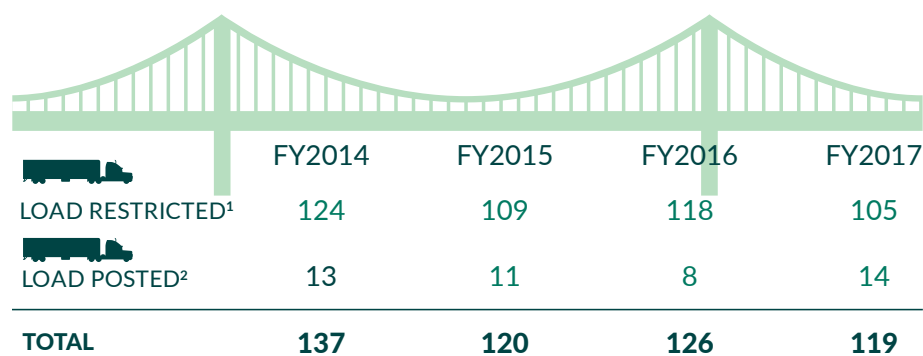
As part of the bridge inspection program, WSDOT performs load rating evaluations to verify whether

bridges can safely carry the weight of the trucks using them. Some bridges are weight restricted because they were designed and built at a time when the standard truck weight was lower. If a load rating evaluation result shows that the structure cannot safely carry certain loads because of bridge deterioration, damage or when it was built, WSDOT implements weight restrictions to reduce the risk of further damage and to ensure bridges are safe for the traveling public.

A bridge may first be load restricted, making it illegal for any overloaded truck to use the bridge. If the condition worsens and the bridge's capacity to carry heavy loads decreases, then the bridge will be "load posted." This limits the allowable weight of trucks to below typical legal weights. Preservation activities are required to correct load restricted or posted bridges.

WSDOT has 119 load restricted or load posted bridges

Fiscal years 2014 through 2017; Number of bridges with weight restrictions



Data source: WSDOT Bridge and Structures Office.

Notes:

¹ A "load restricted" bridge cannot be legally used by an overloaded truck

² A "load posted" bridge limits the allowable weight of trucks to below typical legal weights.

WSDOT takes a Practical Solutions approach to bridge preservation and asset management

WSDOT completed \$15.7 million in maintenance work on bridge decks and structures during FY2017. Maintenance repairs—a key element of WSDOT's Practical Solutions approach to bridge asset management—can substantially extend the amount of time bridges can be used before rehabilitation (more extensive repair) or replacement is needed.

As of June 2017, WSDOT had a statewide bridge maintenance backlog of 1,589 repairs, which it would need an estimated \$16 million to complete. Additionally, the agency has identified 133 larger repairs (estimated to cost \$36.5 million) which will need to be completed through contracts.

Repairing elements extends bridge service life

WSDOT hires contractors to address specific bridge element deterioration beyond what its maintenance crews can accomplish. Examples of this work include replacing steel anchor cables on floating bridges, repairing deteriorated concrete columns, replacing large steel expansion joints, and rehabilitating movable bridge mechanical and electrical systems.

During FY2017, WSDOT awarded contracts on bridge projects that included repairing concrete on a bridge on I-90 in Spokane, replacing anchor cables on the I-90 and SR 104 floating bridges, and repairing concrete columns on several bridges on SR 153. WSDOT currently has a project under

contract to replace gear boxes in the movable span of the SR 104 Hood Canal floating bridge.

WSDOT weighs multiple factors before making bridge repairs

When prioritizing bridge repair needs, WSDOT considers the severity of the issue, the importance of the route, and the risks involved in delaying repairs.

For the 2017-2019 biennium, there is \$41.5 million in planned funding for bridge repairs. Additionally, there are \$400,000 and \$4.6 million reserves for as-needed preservation work on the SR 520 floating bridge and the SR 16 Tacoma Narrows Bridge, respectively. Total funding for bridge repairs in the 2015-2017 biennium (July 2015 through June 2017) was \$37 million.

WSDOT kicks off Systematic Preventive Maintenance program

WSDOT has allocated \$6.0 million to perform systematic preventive maintenance (SPM) on bridges during the 2017-2019 biennium; this additional funding represents a 38.2% increase in the agency's maintenance budget. SPM is an asset management strategy that focuses on using planned maintenance treatments to extend the useful life of existing bridges in a cost-effective way. Work completed as part of SPM may include sealing bridge deck joints on steel truss bridges, filling in ruts on bridge decks, and spot-painting steel bridges.



Agency Emphasis Area **PRACTICAL SOLUTIONS**

Systematic preventive maintenance is a cost-effective asset management strategy that supports Practical Solutions. Applying bridge preservation treatments at the appropriate time can extend a bridge's useful life at a lower lifetime cost.



Strategic Plan Goal 1: **STRATEGIC INVESTMENTS**

Strategic Investments Strategy

Create a process to identify strategic preservation and maintenance investments and strategic operational and multimodal capacity improvement investments in corridors to achieve performance levels.

Asset Management Strategy

Define a strategic, agency-wide asset management policy.

In support of these strategies, WSDOT has implemented a Strategic Bridge Preservation program for the 2017-2019 biennium. The agency will also incorporate strategic preservation into its agency-wide asset management plan, a draft of which is currently in development.



Agency Emphasis Area PRACTICAL SOLUTIONS

By rehabilitating concrete bridge decks using modified concrete overlays rather than replacing them with new decks, WSDOT saves approximately \$220 per square foot of bridge deck area.

Spalling

When reinforcing steel in concrete bridge decks starts to corrode (for example, due to winter weather or the use of deicing salt), the concrete starts to “spall” (pothole) and deteriorate. WSDOT crews repair spalled areas annually, but these repairs are temporary and typically last one to three years. Once the total area of repairs and/or patching exceeds 2% of the total deck area, the bridge is added to the list of future needs projects and classified as structurally deficient. Bridge deck overlay projects are prioritized based on the total square footage of deterioration and the type of freight route on which the bridge is located, with bridges on vital freight routes and those leading to islands getting higher priority.

WSDOT expects concrete bridge deck repairs to cost \$867.9 million over 10 years

WSDOT has 13 bridges under contract to receive a deck repair and overlay, and plans to have an additional 14 bridges either completed or under contract in the 2017-2019 biennium. WSDOT spent \$11.3 million on concrete bridge deck rehabilitation during the 2015-2017 biennium and plans to spend \$35.8 million on similar rehabilitation projects during the 2017-2019 biennium. These planned expenditures will cover 4.1% of the \$867.9 million WSDOT expects to need for concrete bridge deck repairs over the next 10 years (see table at right).

Most WSDOT-owned bridges have reinforced concrete decks. The agency’s comprehensive bridge deck program aims to economically repair and overlay these decks to prolong their lifespan and avoid expensive deck replacements. Deck repairs and protective overlays extend bridges’ service lives by at least 25 to 30 years and are more cost-effective than replacing the entire deck; rehabilitating decks with a concrete overlay costs about \$80 per square foot, while replacing the deck entirely costs \$300 per square foot.

This Practical Solution to bridge deck deterioration substantially reduces overall project costs, and has allowed WSDOT to extend the service life of 343 bridge decks (8.2 million square feet) by 25-30 years. As a result, WSDOT has only had to fully replace 16 bridge decks since the agency was created in 1905 (when it was known as the State Highway Board).

303 bridges will need repairs to concrete decks in next 10 years

As of June 2017; Dollars in millions

Bridge deck status	Number of bridges	Cost to repair
Contract work in progress	13	\$36.8
Past due for Repair ¹	32	\$44.9
Due for Repair ²	42	\$54.3
To be due in next 10 years	216	\$731.9
Total 10-year needs	303	\$867.9

Data source: WSDOT Bridge and Structures Office.

Notes: **1** Bridges with more than 5% of deck area patched or spalled are classified as “past due.” **2** Bridges with 2% to 5% of deck area patched or spalled are classified as “due.”

WSDOT paints steel bridges to extend service life

WSDOT completed two painting projects on steel bridges during FY2017, and a total of five during the 2015-2017 biennium. WSDOT also provided 50% of the funds to paint a portion of the US 101 Columbia River Bridge to Astoria, Oregon.

WSDOT has three bridges currently under contract to be painted and another 17 funded to begin work during the 2017-2019 biennium. The agency has a total of \$82.6 million in funding for steel bridge painting in 2017-2019. WSDOT will need to repaint 184 steel bridges within the next 10 years (see table on p. 25).

WSDOT will need to paint 184 steel bridges in next 10 years

As of June 2017; Dollars in millions

Bridge painting status	Number of bridges	Cost to paint
Contract work in progress	3	\$9.3
Past due for Painting ¹	36	\$159.1
Due for Painting ²	73	\$301.7
Border Bridges ³	4	\$31.0
To be due within 10 years	68	\$280.0
Total 10-year needs	184	\$781.1

Data source: WSDOT Bridge and Structures Office.

Notes: **1** Steel bridges with more than 5% of steel exposed are classified as "past due for painting." **2** Steel bridges with 2% to 5% of steel exposed are classified as "due for painting." **3** Includes all border bridges expected to need painting with 10 years.

Sixteen WSDOT-owned bridges need replacement

As of June 2017; Dollars in millions

Bridge status	Number of bridges	Cost to repair
Contract work in progress	1	\$9.3
Current replacement need	16	\$159.0
Current rehabilitation need	17	\$101.6
Rehabilitation/ Replacement need within 10 years	60	\$319.8
Total 10-year needs	94	\$589.7

Data source: WSDOT Bridge and Structures Office.

WSDOT paints its steel bridges on state highways as needed to protect them against premature corrosion. The agency currently maintains 311 steel bridges that require painting on a regular basis. Washington also has eight steel bridges that cross state lines, and while WSDOT does not directly manage all eight, the agency shares painting costs equally with the bordering states.

Overall, WSDOT needs to replace or rehabilitate 32 bridges statewide

WSDOT replaced one bridge (the SR 142 bridge over the Klickitat River) during FY2017.

WSDOT currently manages 16 bridges that are structurally deficient and require replacement (excluding the State Route 99 Alaskan Way Viaduct Bridge, which has an active replacement contract). An additional 16 structurally deficient bridges need rehabilitation—major preservation repairs—with three of those requiring full bridge deck replacement.

WSDOT's total planned 2017-2019 biennial funding for bridge replacement/rehabilitation is \$84.6 million. WSDOT always estimates the cost of both rehabilitating a bridge and replacing it before deciding on a course of action. If the cost of rehabilitation is 60% or more of the cost of replacement, the agency will replace the bridge.



Agency Emphasis Area PRACTICAL SOLUTIONS

Painting steel bridges supports Practical Solutions by minimizing bridge life cycle cost. Painting a steel bridge extends its service life by 20 to 25 years, and costs approximately 20-25% as much as replacing it.



Agency Emphasis Area PRACTICAL SOLUTIONS

WSDOT always estimates the cost of both rehabilitating a bridge and replacing it before deciding on a course of action. If the cost of rehabilitation is 60% or more of the cost of replacement, the agency will replace the bridge.

Connecting Washington addresses bridge preservation needs

As part of the \$16 billion Connecting Washington transportation revenue package, \$1.2 billion is allocated to state highway preservation, which includes maintaining pavement, bridges and traffic operations. WSDOT is working to identify bridge preservation projects as part of this investment. Three bridge projects identified by the Legislature will be addressed in the next six years:

- SR 241 Yakima River bridge near Mabton—\$12 million
- US 12 Wildcat Creek bridge near White Pass—\$12 million
- SR 107 Chehalis River bridge near Montesano—\$12.5 million

In addition to the \$1.2 billion, another \$57.5 million from Connecting Washington is allocated to bridge preservation and repair projects over the next 16 years. No specific projects have been identified as part of this investment.

Connecting Washington funding will not allow WSDOT to restore all of its structurally deficient bridges to fair or better condition. Structurally deficient does not mean that a bridge is unsafe or in need of replacement; typically, one or more of the bridge's components requires either repair or preservation. Using a lowest life cycle cost approach to delivering preservation strategies means that there will continue to be bridge components that need work.

Connecting Washington will help address the most critical needs for bridges. In particular, it will help eliminate most of the weight restrictions on many of the deficient bridges and help prevent new weight restrictions from being imposed.

WSDOT will replace US 101 Elwha River Bridge near Port Angeles

Engineers are designing a bridge to replace the US 101 bridge over the Elwha River near Port Angeles. The new bridge will meet current standards and resist future river scour and earthquakes.

The existing Elwha River Bridge was built in 1926, after the original Glines Canyon and Elwha dams were constructed. When the dams were removed in 2012 as part of a National Park Service project to restore the Elwha River to its pre-dam state, the river began aggressively removing loose rock in the riverbed, leading to severe scour around the bridge's foundations (see photo at right).



The US 101 bridge over the Elwha River.

the highest-priority scour repairs needed. Scour repair projects for the three highest-priority bridges (the US 101 Chehalis River bridge, the SR 529 Union Slough bridge and the US 2 South Fork Skykomish River bridge) are currently in the design phase, with construction planned to begin in 2018. Total funding for scour repair in the 2017-2019 biennium is \$6.6 million.

WSDOT constructs temporary bridge over San Poil River after closure due to flooding

In April 2017, a flood on the San Poil River severely scoured the approaches and foundations of the SR 21 West Fork San Poil River Bridge (located south of Republic on the Colville Indian Reservation in rural eastern Washington), leading WSDOT to close the bridge.

WSDOT maintenance crews came from all over the state—including Spokane, Vancouver and the Tacoma Narrows Bridge—to install a temporary Bailey bridge (a steel bridge made of pre-fabricated, re-usable parts). Installing the Bailey bridge took four days, after which WSDOT engineers worked with a contractor to repair the approach roadways. The Bailey bridge, which allows one lane of alternating traffic to cross the river, opened 13 days after the original bridge was closed.

Bridge Scour

Bridges experience “scour” when high volumes of water cause soil erosion around their foundation. Foundation scour is the leading cause of bridge failures in Washington and nationwide.

WSDOT has 268 bridges at risk for scour

WSDOT manages 1,557 vehicular bridges and culverts longer than 20 feet that cross over water. Of these, 268 (17%) are “scour critical,” meaning they are at risk for future scour. All scour critical bridges are inspected every two years as part of routine bridge inspections.

In 2016, WSDOT reviewed the conditions and original plans of all scour critical bridges, and established

WSDOT is prioritizing I-405 bridges for seismic retrofits

WSDOT suspended bridge seismic retrofit projects during FY2017 in order to reassess its use of available funding. Following the “Cascadia Rising” earthquake drill (see [Gray Notebook 62 pp. 21-22](#)) and ongoing updates to the Resilient Washington initiative, WSDOT determined that it will further develop its network of seismically resilient routes in the Puget Sound region (see [bit.ly/SeismicLifeline](#)).

WSDOT has previously prioritized retrofitting bridges on I-5 between Joint Base Lewis McChord and the I-405 interchange near Renton. Most of these retrofits are now complete,

WSDOT completes 316 seismic retrofits to its bridges

As of June 2017

Bridge status	Number of bridges
Retrofit complete ¹	316
Partially retrofitted	119
Retrofit needed	474
Total	909

Data source: WSDOT Bridge and Structures Office.

Notes: ¹ Excluding foundations.

and the agency's next priority will be retrofitting bridges on I-405. During the 2017-2019 biennium, WSDOT will plan retrofits of one remaining bridge on I-5 (in Olympia) and of bridges on SR 518 and I-405.

WSDOT's Bridge Seismic Retrofit Program, launched in 1991, is a plan to make 909 bridges in the western

half of Washington state resilient to earthquakes. So far, 316 bridges have been retrofitted to withstand earthquakes, most commonly by putting steel jacketing around columns or by adding concrete-and-steel reinforcing to pier caps.

Contributors included Chris Keegan, Roman Peralta, Tim Rydholm, Ernie Sims, DeWayne Wilson, Helen Goldstein and Joe Irwin

A closer look at MAP-21, Results Washington and GASB bridge condition targets

The federal Moving Ahead for Progress in the 21st Century Act (MAP-21, see [p. 9](#)) requires states to maintain their bridges so that less than 10% of National Highway System (NHS) bridge deck area in each state is located on bridges classified as structurally deficient (in poor condition). The Results Washington goal mirrors this federal requirement (see [p. 21](#)).

WSDOT also follows infrastructure asset reporting policies of the Governmental Accounting Standards Board (GASB), which establishes reporting standards for state and local governments that follow Generally Accepted Accounting Principles. For GASB reporting, WSDOT has set a condition goal of 90% of WSDOT-owned bridge deck area in fair or better condition.

Bridge condition reporting requirements

Condition targets by performance reporting system

Reporting system	Target	Included bridges
Moving Ahead for Progress in the 21st Century	≤10% of deck area on structurally deficient (poor condition) bridges	All NHS bridges (WSDOT- and locally owned)
Results Washington	≤10% of deck area on structurally deficient (poor condition) bridges	All NHS bridges (WSDOT- and locally owned)
Governmental Accounting Standards Board	>90% of bridge deck area in fair or better condition	All WSDOT-owned bridges (NHS and non-NHS)

Data source: WSDOT Office of Strategic Assessment and Performance Analysis.

Note: NHS = National Highway System.